

FP03035US

## ENGAGING STRUCTURE FOR HEAT SINK

### FIELD OF THE INVENTION

The present invention relates to a radiator, heat sink units of which can be engaged rapidly in a row by a progressive die, and more particularly, to an  
5 engaging structure for connection between the heat sink units in the radiator.

### DESCRIPTION OF THE RELATED ART


Heat elimination for electronic devices, integrate circuits and micromodules  
10 is important for computers and electronic instruments to be developed in miniaturization and portable type. In recent years, radiators has been changed in structure due to progress in technology, typical one of which is a radiator, heat sink units of which can be engaged rapidly in a row by a progressive die. For example, the utility model application No. 090208102, entitled an engaging  
15 structure for a heat sink and filed on may 18, 2001, is published on December 11, 2001 in announcement serial number 468931 in Taiwan Patent Gazette. The application No. 090208102 mainly disclosed that provided on upper and lower ends of the heat sink, respectively, are short edgefolds, at each of the corner portions of which hook portions are formed by pressing or punching, respectively,  
20 and elongated notches are formed at conjunction positions corresponding to the hook portions between the short edgefolds and the heat sink by pressing or punching, respectively, so that the engaging structures can be formed at the corner portions by a progressive die, and thus the heat sinks can be assembled in a row rapidly and securely. Although the radiator disclosed in the utility model  
25 has greatly improved the prior radiator in which heat sink units are engaged with each other and positioned in a row with recess portions and projection portions thereof, the radiator has following disadvantages. 1. The radiator is formed by a complicated manufacture process due to the complicated structure of the hook portions and too much bending or folding. 2. The corresponding dies have a  
30 complicated structure and high cost due to the complicated structure of the hook

portions and too much bending or folding. 3. The amount of material for the radiator increases due to large expanded blank size. 4. The heat sinks are inconveniently disassembled from one another since the hook portions are latched in the elongated.

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## SUMMARY OF THE INVENTION

Accordingly, in order to improve the structure of the heat sink, the object of the present application is to provide a simple and secure engaging structure for the heat sinks by which the heat sink units of the heat sinks can be engaged rapidly in a row by a progressive die, so as to overcome the above-mentioned disadvantages.

The object of the present invention is achieved by providing an engaging structure for heat sinks, wherein an edgefold is provided on each of the two opposite sides of the heat sink unit, respectively. At least one engaging cut having a  shape is formed in a section connecting the respective edgefolds and a base sheet by punching or pressing, respectively, before the edgefolds are formed. After the edgefolds are formed by bending the corresponding sheet, the recess in the upper portion of the engaging cut functions as an engaging groove, while the projection in the lower portion of the engaging cut functions as an engaging projection. The engaging grooves are disposed at the top of each of the edgefolds, the portions of which corresponding to the engaging cuts or the engaging grooves partially project, while the engaging projections are disposed in the base sheet at a conjunction position between the root of respective edgefolds and the base sheet, and the engaging projections project outwards.

The engaging grooves are aligned with the corresponding engaging grooves and match with the corresponding engaging grooves in width; the engaging grooves of the heat sink unit are engaged with the engaging projections of the previous heat sink unit, while the engaging projections of the heat sink unit are engaged with the engaging grooves of the next heat sink unit, so that the heat sink units are superposed and engaged with one another in a row.

The contents and changes of the above technical scheme are described as follows.


1. The heat sink unit means basic heat sink structure, which is repeated and has the same structure. The base sheet means the main body or main plate of the heat sink unit except from the edgefolds.

2. The number of the engaging structure in the above technical scheme can be one set, two sets, three sets or more than three sets on each side of the heat sink unit, or odd set or odd sets on one side of the heat sink unit and even sets on the other side. Preferably, two or three sets of engaging grooves and engaging projections spaced from one another are provided on each side. If two sets of engaging grooves and engaging projections are provided on each side of the heat sink unit, normally, the engaging grooves and engaging projections are symmetrically spaced from each other. If three sets of engaging grooves and engaging projections are provided on each side of the heat sink unit, normally, the engaging grooves and engaging projections are disposed at left, middle and right portions on each side.

3. The edgefold in the above technical scheme can be formed in two manners, one of which is that the edgefold on each of the two opposite sides is a whole-length structure which is integrated or formed in one piece, and the heat sink units formed by this manner is adapted to the case where heat emission is carried out by forcibly ventilating, and the other one of which is that one of the edgefolds on each of the two opposite sides is a whole-length structure while the other one is a partial edgefold structure which is formed by bending part of the corresponding sheet, and the heat sink units formed by this manner is adapted to common radiators, in which the whole-length structure edgefold is generally in contact with the heat source while the other edgefold formed by bending part of the corresponding sheet are only used to provide the engaging structure.

The above changes and modifications are to be understood as being within the scope of the present invention as defined by appended claims.

The principle of the present invention is as follows. At least one set of

engaging groove and engaging projection is formed at each of two conjunction portions between each of the edgefolds and the base sheet by punching corresponding cuts having a  shape and bending and forming the edgefolds, respectively, and is positioned so that the heat sink units can be directly and continuously connected or snapped in a row with the progressive die. The whole pressing and assembling process is punching locating holes → punching engaging cuts → blanking a piece of sheet to be formed as a heat sink unit → bending engaging flanges → forming edgefolds → assembling heat sink units by engaging them.

10        The present invention has following advantages and effects due to the above technical scheme compared with the prior art.

1. The heat sink according to the present invention has a simple engaging structure with less number of bending so that the manufacturing process of the heat sink is simple.

15        2. The heat sink according to the present invention is formed with six steps while the heat sink according to the prior art is formed with at least eight steps.

3. Since the die for the heat sink according to the present invention is simpler than that according to the prior art due to the simple engaging structure, the cost of the die for the heat sink of present invention is decreased.

20        4. Since the heat sink according to present invention has a smaller expanding size than that according to the prior art in the case where the heat sinks have the same profile size, less amount of material is used.

25        5. The engaging structure according to present invention not only can securely be connected with one another, but also can be conveniently detached from one another.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and advantages of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

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Fig. 1 is a perspective view showing a heat sink unit according to the present invention,

Fig. 2 is a perspective view showing the heat sink units according to the present invention are overlapped and engaged with each other in a row,

5 Fig. 3 is an enlarged view showing engaging structure in the heat sink unit according to the present invention, and


Fig. 4 is a partially enlarged view showing the assembly of two heat sinks according to present invention by engaging.

10 In the attached drawings, the reference numeral 1 designates a flange; the reference numeral 2 designates an edgefold; the reference numeral 3 designates an engaging groove; the reference numeral 4 designates an engaging projection; and the reference numeral 5 designates base sheet.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

15 Reference will now be made in detail to the present preferred embodiment of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiment is described below in order to explain the present invention by referring to the figures.

20 [First embodiment]


Referring to the figs. 1 to 4, there is provided an engaging structure for heat sinks , a whole-length edgefold 2 is provided on each of the two opposite sides of the heat sink unit, respectively. Two engaging cuts having a  shape and spaced from each other are formed in a section connecting the respective edgefolds 2 and a base sheet 5 by punching or pressing, respectively, before the edgefolds 2 are formed. After the edgefolds 2 are formed by bending the corresponding sheet, the recess in the upper portion of the engaging cut functions as an engaging groove 3, while the projection in the lower portion of the engaging cut functions as an engaging projection 4. The engaging grooves 3 are disposed at the top of each of the edgefolds 2, the portions of edgefolds 2

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corresponding to the engaging cuts or the engaging grooves 3 partially project and are formed as flanges 1, while the engaging projections 4 are disposed in the base sheet 5 at a conjunction position between the root of respective edgefolds 2 and the base sheet 5, and the engaging projections 4 project outwards. The engaging grooves 3 are aligned with the corresponding engaging grooves 4 and match with the corresponding engaging grooves 4 in width. When engaging the heat sink units with each other, all of the engaging grooves 3 of the heat sink unit are engaged with the engaging projections 4 of the previous heat sink unit, while the engaging projections 4 of the heat sink unit are engaged with the engaging grooves 3 of the next heat sink unit, so that the heat sink units are superposed and engaged with one another in a row, and thus being assembled into a radiator. When a progressive die is used, the pressing and assembling process is: punching locating holes → punching engaging cuts → blanking a piece of sheet to be formed as the heat sink unit → bending the engaging flanges → forming the edgefolds → assembling the heat sink units by engaging them.

#### Second embodiment

There is provided an engaging structure for a heat sink according to this embodiment, a whole-length edgefold 2 is provided on each of the two opposite sides of the heat sink unit, respectively. Three engaging cuts having a  shape and spaced from each other are formed in a section connecting the respective edgefolds 2 and a base sheet 5 by punching or pressing, respectively, so that three sets of engaging grooves 3 and engaging projections 4 are arranged at left, middle and right portions on each side where the edgefold 2 is formed. The other parts of the heat sink according to this embodiment are same as those in the first embodiment.

#### [Third embodiment]

There is provided an engaging structure for heat sinks according to this embodiment, a whole-length edgefold 2 is provided on one of the two opposite

sides of the heat sink unit, a separated two-pieces edgefold 2 is provided on the other side of the heat sink unit. Two sets of engaging grooves 3 and engaging projections 4 spaced from each other are arranged on the side where the whole-length edgefold 2 is provided, while one set of engaging groove 3 and engaging projection 4 is arranged at a position corresponding to each of the separated two pieces of the separated two-pieces edgefold 2 on the side where separated two-pieces edgefold 2 is provided, respectively. The other parts of the heat sink according to this embodiment are same as those in the first embodiment.

#### 10 Forth embodiment

There is provided an engaging structure for heat sinks according to this embodiment, a whole-length edgefold 2 is provided on each of the two opposite sides of the heat sink unit, respectively. Two sets of engaging grooves 3 and engaging projections 4 spaced from each other are arranged on one side where one of the two edgefold 2 is provided, while one set of engaging groove 3 and engaging projection 4 is arranged on the other side where the other edgefold 2 is provided. The other parts of the heat sink according to this embodiment are same as those in the first embodiment.

Although the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it would be appreciated by those skilled in the art that changes may be made in the embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.